

What Works Clearinghouse



Science

May 2012

The Center for Learning Technologies in Urban Schools (LeTUS) Program[®]

No studies of *LeTUS* that fall within the scope of the Science review protocol meet What Works Clearinghouse (WWC) evidence standards. The lack of studies meeting WWC evidence standards means that, at this time, the WWC is unable to draw any conclusions based on research about the effectiveness or ineffectiveness of *LeTUS* on middle school students. Additional research is needed to determine the effectiveness or ineffectiveness of this intervention.

Program Description¹

The *LeTUS* program is a three-year, project-based, technology-integrated middle school science curriculum for grades 6–8. The *LeTUS* program is composed of multiple units, each lasting between eight and ten weeks. Topics include global warming, water and air quality, force and motion, communicable diseases, and ecological systems. The units are designed around projects through which students learn science by conducting scientific investigations and using interactive computer software along with scientific visualization and graphing tools. Each unit stresses inquiry, student collaboration, and the use of computing and communications technologies. The sequence of units can be used in different ways, depending on standards and curriculum requirements; for example, teachers can use units at grade levels other than those suggested. Each unit can also be used independently when inserted into a different curricular context.

Research²

The WWC identified five studies of *LeTUS* for middle school students that were published or released between 1990 and 2011.

- One study is within the scope of the Science review protocol but does not meet WWC evidence standards. This study uses a quasi-experimental design but does not establish that the comparison group was comparable to the treatment group prior to the start of the intervention.
- Two studies are out of the scope of the Science review protocol because they have an ineligible study design; they do not use a comparison group design.
- Two studies are out of the scope of the Science review protocol for reasons other than study design; they do not include an eligible science outcome.

References

Study that does not meet WWC evidence standards

Geier, R., Blumenfeld, P. C., Marx, R. W., Krajcik, J. S., Fishman, B., Soloway, E., & Clay-Chambers, J. (2008). Standardized test outcomes for students engaged in inquiry-based science curricula in the context of urban reform. *Journal of Research in Science Teaching*, 45(8), 922–939. The study does not meet WWC evidence standards because it uses a quasi-experimental design in which the analytic intervention and comparison groups are not shown to be equivalent.

Additional source:

Geier, R., Blumenfeld, P., Marx, R., Krajcik, J., Fishman, B., & Soloway, E. (2004, June). Standardized test outcomes of urban students participating in standards and project-based science curricula. In Y. B. Kafai, W. A. Sandoval, N. Enyedy, A. S. Nixon, & F. Herrera (Eds.), *Proceedings of the Sixth International Conference on the Learning Sciences*. University of California–Los Angeles, Santa Monica.

Studies that are ineligible for review using the Science Evidence Review Protocol

Herman, P., Mackenzie, S., Sherin, B., & Reiser, B. (2002, October). *Assessing student learning in project-based science classrooms: Development and administration of written assessments*. Paper presented at the International Conference of the Learning Sciences, Seattle, WA. The study is ineligible for review because it does not use a comparison group design or single-case design.

Hug, B., Krajcik, J. S., & Marx, R. W. (2005). Using innovative learning technologies to promote learning and engagement in an urban science classroom. *Urban Education*, 40(4), 446–472. The study is ineligible for review because it does not include an outcome within a domain specified in the protocol.

Marx, R. W., Blumenfeld, P. C., Krajcik, J. S., Fishman, B., Soloway, E., Geier, R., & Tal, R. T. (2004). Inquiry-based science in the middle grades: Assessment of learning in urban systemic reform. *Journal of Research on Science Teaching*, 41(10), 1063–1080. The study is ineligible for review because it does not use a comparison group design or a single-case design.

Tal, T., Krajcik, J. S., & Blumenfeld, P. C. (2006). Urban schools' teachers enacting project-based science. *Journal of Research in Science Teaching*, 43(7), 722–745. The study is ineligible for review because it does not include an outcome within a domain specified in the protocol.

Endnotes

¹ The descriptive information for this program was obtained from a publicly available source: the program's website (http://detroitk12.org/admin/academic_affairs/dusp/letus.htm, downloaded August 2011). The WWC requests developers to review the program description sections for accuracy from their perspective. The program description was provided to the developer in August 2011; however the WWC received no response. Further verification of the accuracy of the descriptive information for this program is beyond the scope of this review. The literature search reflects documents publicly available by June 2011.

² The studies in this report were reviewed using WWC Evidence Standards, version 2.1, as described in the Science review protocol, version 2.0. The evidence presented in this report is based on available research. Findings and conclusions may change as new research becomes available.

Recommended Citation

U.S. Department of Education, Institute of Education Sciences, What Works Clearinghouse (2012, May). *Science intervention report: The Center for Learning Technologies in Urban Schools (LeTUS) Program*. Retrieved from <http://whatworks.ed.gov>.

Glossary of Terms

Attrition	Attrition occurs when an outcome variable is not available for all participants initially assigned to the intervention and comparison groups. The WWC considers the total attrition rate and the difference in attrition rates across groups within a study.
Clustering adjustment	If treatment assignment is made at a cluster level and the analysis is conducted at the student level, the WWC will adjust the statistical significance to account for this mismatch, if necessary.
Confounding factor	A confounding factor is a component of a study that is completely aligned with one of the study conditions, making it impossible to separate how much of the observed effect was due to the intervention and how much was due to the factor.
Design	The design of a study is the method by which intervention and comparison groups were assigned.
Domain	A domain is a group of closely related outcomes.
Effect size	The effect size is a measure of the magnitude of an effect. The WWC uses a standardized measure to facilitate comparisons across studies and outcomes.
Eligibility	A study is eligible for review and inclusion in this report if it falls within the scope of the review protocol and uses either an experimental or matched comparison group design.
Equivalence	A demonstration that the analysis sample groups are similar on observed characteristics defined in the review area protocol.
Extent of evidence	An indication of how much evidence supports the findings. The criteria for the extent of evidence levels are given in the WWC Procedures and Standards Handbook (version 2.1).
Improvement index	Along a percentile distribution of students, the improvement index represents the gain or loss of the average student due to the intervention. As the average student starts at the 50th percentile, the measure ranges from -50 to +50.
Multiple comparison adjustment	When a study includes multiple outcomes or comparison groups, the WWC will adjust the statistical significance to account for the multiple comparisons, if necessary.
Quasi-experimental design (QED)	A quasi-experimental design (QED) is a research design in which subjects are assigned to treatment and comparison groups through a process that is not random.
Randomized controlled trial (RCT)	A randomized controlled trial (RCT) is an experiment in which investigators randomly assign eligible participants into treatment and comparison groups.
Rating of effectiveness	The WWC rates the effects of an intervention in each domain based on the quality of the research design and the magnitude, statistical significance, and consistency in findings. The criteria for the ratings of effectiveness are given in the WWC Procedures and Standards Handbook (version 2.1).
Single-case design	A research approach in which an outcome variable is measured repeatedly within and across different conditions that are defined by the presence or absence of an intervention.
Standard deviation	The standard deviation of a measure shows how much variation exists across observations in the sample. A low standard deviation indicates that the observations in the sample tend to be very close to the mean; a high standard deviation indicates that the observations in the sample tend to be spread out over a large range of values.
Statistical significance	Statistical significance is the probability that the difference between groups is a result of chance rather than a real difference between the groups. The WWC labels a finding statistically significant if the likelihood that the difference is due to chance is less than 5% ($p < 0.05$).
Substantively important	A substantively important finding is one that has an effect size of 0.25 or greater, regardless of statistical significance.

Please see the WWC Procedures and Standards Handbook (version 2.1) for additional details.